SIEMENS

SIMATIC NET

S7-1200 - Telecontrol CP 1243-1 DNP3, CP 1243-1 IEC

Operating Instructions

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⚠WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

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Preface

Validity of this manual

This document contains information on the following telecontrol products:

- **CP 1243-1 DNP3**
  Article number6GK7 243-1JX30-0XE0
  Hardware product version 1
  Firmware version V1.1

  The CP 1243-1 DNP3 is the communications processor for connecting SIMATIC S7-1200 to control centers using the DNP3 protocol.

- **CP 1243-1 IEC**
  Article number6GK7 243-1PX30-0XE0
  Hardware product version 1
  Firmware version V1.1

  The CP 1243-1 IEC is the communications processor for connecting SIMATIC S7-1200 to control centers using the IEC 60870-5 protocol.



Figure 1 CP 1243-1 DNP3

The CP 1243-1 IEC has the same outer design as the CP 1243-1 DNP3 apart from the inscriptions for the product name, article number, firmware version and possibly hardware product version.

At the top right behind the hinged cover of the module housing, you will see the hardware product version printed as a placeholder "X" after the article number. If the printed text is, for example, "X 2 3 4", "X" would be the placeholder for hardware product version 1.

Product names and abbreviations

In this document, you will find the following designations used for the product being described here:

- **CP**

  Simplified naming of the two following products:

  – CP 1243-1 DNP3

  – CP 1243-1 IEC

  This short form is used in this manual if the property being described in the particular context applies to both modules.

- **DNP3-CP**

  Short form for the CP 1243-1 DNP3 (6GK7 243-1JX30-0XE0)

- **IEC-CP**

  Short form for the CP 1243-1 IEC (6GK7 243-1PX30-0XE0)

Purpose of the manual

This manual describes the properties of both these modules and supports you when installing and commissioning them.

The required configuration steps are described as an overview and there are explanations of the relationship between firmware functions and configuration.

You will also find information about the diagnostics options of the device.

New in this issue

- Inclusion of the CP 1243-1 IEC
- New firmware version of the DNP3 CP with bugs fixed

  Make sure that the DNP3 CP with firmware version V1.0 or V1.1 is compatible with the firmware of the CPU, refer to the section Hardware requirements (Page 17).

- Editorial revision

  As a supplement to the STEP 7 information system, note the information on the functions and parameters in the section Notes on configuring individual functions (Page 42).

Replaced documentation

This manual replaces the manual release 07/2013.

Current manual release on the Internet

You will also find the current version of this manual on the Internet pages of Siemens Industry Online Support in the directory of the relevant CP. This is located below the directory with the following entry ID:

16514597 (http://support.automation.siemens.com/WW/view/en/16514597)

Required experience

To install, commission and operate the CP, you require experience in the following areas:

- Automation engineering
- Setting up the SIMATIC S7-1200
- SIMATIC STEP 7 Basic / Professional
- DNP3 protocol or protocol according to IEC 60870-5

Requirements for use of the module

You will find the requirements for using the module in the section Hardware requirements (Page 17).

Sources of information and other documentation

You will find an overview of further reading and references in the Appendix of this manual.

SIMATIC NET glossary

Explanations of many of the specialist terms used in this documentation can be found in the SIMATIC NET glossary.

You will find the SIMATIC NET glossary here:

- SIMATIC NET Manual Collection or product DVD

  The DVD ships with certain SIMATIC NET products.

- On the Internet under the following entry ID:

  50305045 (http://support.automation.siemens.com/WW/view/en/50305045)

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Note

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You will find license conditions in the following documents on the supplied data medium:

- DOC_OSS-S7CMCP_74.pdf
- DOC_OSS-CP1243-1DNP3-IEC_76.pdf

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To ensure the secure operation of a plant or machine it is also necessary to take suitable preventive action (e.g. cell protection concept) and to integrate the automation and drive components into a state-of-the-art holistic industrial security concept for the entire plant or machine. Any third-party products that may be in use must also be taken into account. Please find further information at: http://www.siemens.com/industrialsecurity

Training, Service & Support

You will find information on Training, Service & Support in the multi--language document "DC_support_99.pdf" on the data medium supplied with the documentation.

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Application and properties

1

1.1 Communications services

Communications services

The following communications services are supported:

DNP3-CP

- **DNP3 protocol**

  Communication is based on the DNP3 SPECIFICATION Version 2.x (2007/2009).

  The CP is a communications processor of the SIMATIC S7-1200 for system connection to control centers using the DNP3 protocol for telecontrol applications.

  An S7-1200 with CP 1243-1 DNP3 operates as a DNP3 station (Outstation).

  The CP supports the implementation level 1 - 4 (DNP3 Application Layer protocol Level). You will find a description of the other functions in the section Partner stations (Page 46).

- **S7 communication and PG/OP communication with the following functions:**
  - PUT/GET as client and server for data exchange with remote stations (S7-300/400/1200/1500)
  - PG functions
  - Operator control and monitoring functions (HMI)

IEC-CP

- **Protocol IEC 60870-5**

  Communication is based on the specification IEC 60870-5 Part 1 - 5 (1990 - 1995) and part 104 (2000).

  The CP is a communications processor of the SIMATIC S7-1200 for system connection to control centers using the IEC 60870-5 protocol for telecontrol applications.

  An S7-1200 with CP 1243-1 IEC operates as a substation (slave).

- **S7 communication and PG/OP communication with the following functions:**
  - PUT/GET as client and server for data exchange with remote stations (S7-300/400/1200/1500)
  - PG functions
  - Operator control and monitoring functions (HMI)

Status IDs of data points

The status IDs listed in the following tables are transferred for each data point in each frame in 1 byte.

The meaning relates to the bit status in the last row of each table.

Table 1- 1 DNP3: Byte assignment of the status byte for DNP3 data points

Bit	7	6	5	4	3	2	1	0
Flag name	-	-	-	LOCAL_-FORCED	DISCONTI-NUITY	OVER_-RANGE	RESTART	ONLINE
Meaning	-	-	-	Local operator control	Counted value overflow before reading the value	Value range exceeded, analog value	Value not updated after start	Value is invalid
Bit status	*(always 0)*	*(always 0)*	*(always 0)*	1	1	1	1	1

Table 1- 2 IEC: Byte assignment of the status byte for IEC data points

Bit	7	6	5	4	3	2	1	0
Flag name	-	-	SB substituted	-	CY carry	OV overflow	NT not topical	IV invalid
Meaning	-	-	Substitute value	-	Counted value overflow before reading the value	Value range exceeded, analog value	Value not updated	Value is invalid
Bit status	*(always 0)*	*(always 0)*	1	*(always 0)*	1	1	1	0

1.2 Other services and properties

Other services and properties

- **Data point configuration**

  Due to the data point configuration in STEP 7, programming program blocks in order to transfer the process data is unnecessary. The individual data points are processed one-to-one in the control system.

- **Security functions (DNP3 only)**

  The DNP3 CP can use the security functions specified in the DNP3 protocol and therefore secure communication in the DNP3 network, including the following:

  – Secure authentication (SA) of the communications partner

    The DNP3 CP checks whether the communications partner has the right to access the DNP3 CP.

    Formation of the Message Authentication Code (MAC) using symmetrical (pre-shared key, PSK) or asymmetrical cryptography (public/private keys)

    Use of IPsec for transferring the key

  – Logging of security events: Successful and failed authentication, key exchange, statistical counters

  You enable the security functions in the STEP 7 configuration with the required options.

- **IP configuration - IPv4 and IPv6**

  The essential features of IP configuration for the CP:

  – The CP supports IP addresses according to IPv4 and IPv6.

  – An IPv6 address can be used in addition to an IPv4 address.

  – Address assignment:

    The IP address, the subnet mask and the address of a gateway can be set manually in the configuration.

    As an alternative, the IP address can be obtained from a DHCP server or by other means outside the configuration.

- **Time-of-day synchronization over Industrial Ethernet**

  The CP can the have its local time of day synchronized by the partner (master) as UTC time.

  The time of day can be read from the CPU. The mechanisms are described in the STEP 7 information system.

  For information on the format of the time stamp, refer to the section Datapoint types (Page 35).

- **Redundancy**

  The CP can communicate with a redundant control system (master).

- **Storage of events**

  The CP can store events of different classes and transfer them together to the master.

- **Data transfer is on request or triggered**

  The sending of data to the master can be triggered in two ways:

  – At the request of the master

  – Triggered by various selectable criteria

- **Messages / e-mail**

  With configured events in the process image of the CPU, the CP can send messages as e-mails. The data of the events to be sent by e-mail are configured using PLC tags.

- **Analog value processing**

  Analog values can be preprocessed on the CP according to various methods.

- **Online functions**

  From an engineering station (ES) on which STEP 7 is installed, you can use the online functions of STEP 7 via the CP to access the S7-1200 CPU if the station is located in the same IP subnet. The following online functions are available:

  – Downloading project or program data from the STEP 7 project to the station

  – Querying diagnostics data on the station

  – Downloading firmware files to the CP

  For a remote station located in a different IP subnet or that can be reached via the Internet, these functions can only be used if the ES is connected to the station via a VPN tunnel (for example via a SCALANCE S).

- **SNMP**

  As an SNMP agent, the CP supports data queries using SNMP (Simple Network Management Protocol) in version V1.

  For more detailed information, refer to section Communication types and SNMP (Page 42).

1.3 Configuration limits and performance data

Number of CMs/CPs per station

In each S7-1200 station, up to three CMs/CPs can be plugged in and configured; this means a maximum of three identical CP 1243-1 DNP3 or three identical CP 1243-1 IEC modules.

Connection resources

- **TCP connections to masters (DNP3 or IEC)**

  The CP can establish connections to up to 4 masters. These can be single or redundant masters.

  In the case of 4 redundant masters, this would be 8 physical devices addressed using different IP addresses.

- **Online functions / TeleService**

  1 connection resource is reserved for online functions / TeleService.

- **S7 connections**

  8 connection resources for S7 connections (PUT/GET)

- **PG/OP connections**

  – 1 connection resource for PG connections

  – 3 connection resources for OP connections

Number of data points for the data point configuration

The maximum number of configurable data points is 200.

User data

The data to be transferred by the CP is assigned to various data points in the STEP 7 configuration. The size of the user data per data point depends on the data type of the relevant data point.

With the DNP3 CP, contiguous memory areas can be transferred up to a size of 64 bytes using data point types of the object groups 110 (Octet String) and 111 (Octet String Event). You will find details in the information system of STEP 7 and in the section Datapoint types (Page 35).

Frame memory (send buffer)

The CP has a frame memory (send buffer) for data points configured as an event.

The send buffer has a maximum size of 64000 events divided into equal parts for all configured communications partners. The size of the frame memory can be set in STEP 7, refer to the section Communication with the CPU (Page 49).

You will find details of how the send buffer works (storing and sending events) as well as the options for transferring data in the section Types of transmission, event classes, triggers (Page 39).

Messages / e-mail

Up to 10 messages can be configured in STEP 7 and sent as e-mails.

1.4 DNP3 device profile

Detailed information on DNP3 attributes in the DNP3 device profile

You will find a detailed overview of the attributes and properties specified in the DNP3 protocol and supported by the CP in the DNP3 device profile.

You will find the DNP3 device profile of the CP 1243-1 DNP3 on the Internet pages of Siemens Industry Online Support under the following entry ID:

82856876 (http://support.automation.siemens.com/WW/view/en/82856876)

1.5 Configuration examples

1.5.1 Configuration with 1 subnet

Configuration example with a non-redundant control center

The following example describes a configuration with a non-redundant control center in which all nodes are located in 1 IP subnet.

In this example, the DNP3 protocol is used; in other words, the stations are equipped with a CP 1243-1 DNP3.

A configuration in which the IEC protocol is used would have the same setup apart from the CP type (here CP 1243-1 IEC).

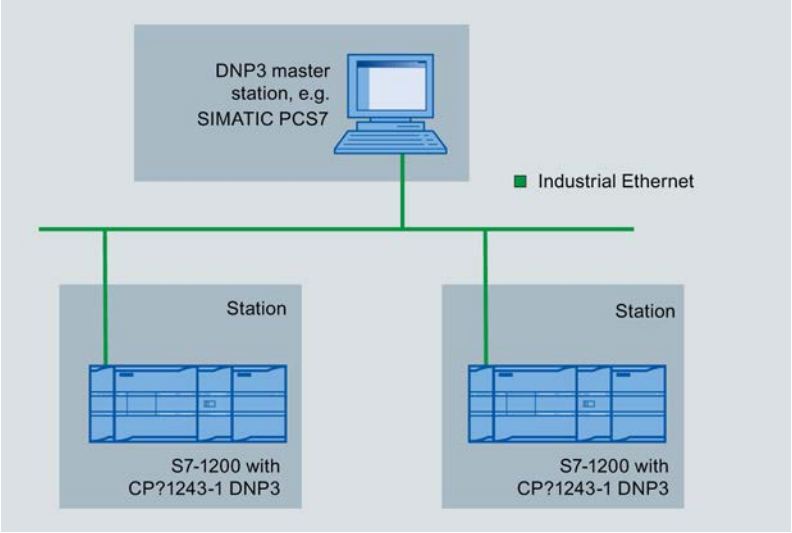


Figure 1-1 Configuration example with a non-redundant control center and stations in one IP subnet

The S7-1200 stations are connected to the Internet via the CP and connected to the control center.

When using the DNP3 protocol, for example, SIMATIC PCS 7 TeleControl or the system of a third-party provider can be used as the control center. If you use SIMATIC PCS 7 TeleControl as the DPN3 master in the control center, you require the necessary DPN3 driver.

1.5.2 Configuration with connections over the Internet

Configuration example with connections over the Internet

The following example contains a configuration with a non-redundant control center.

In this example, the DNP3 protocol is used; in other words, the stations are equipped with a CP 1243-1 DNP3.

A configuration in which the IEC protocol is used would have the same setup apart from the CP type (here CP 1243-1 IEC).

The S7-1200 stations are connected to the Internet via the CP and connected to the control center.

When using the DNP3 protocol, for example, SIMATIC PCS 7 TeleControl or the system of a third-party provider can be used as the control center. If you use SIMATIC PCS 7 TeleControl as the DPN3 master in the control center, you require the necessary DPN3 driver.

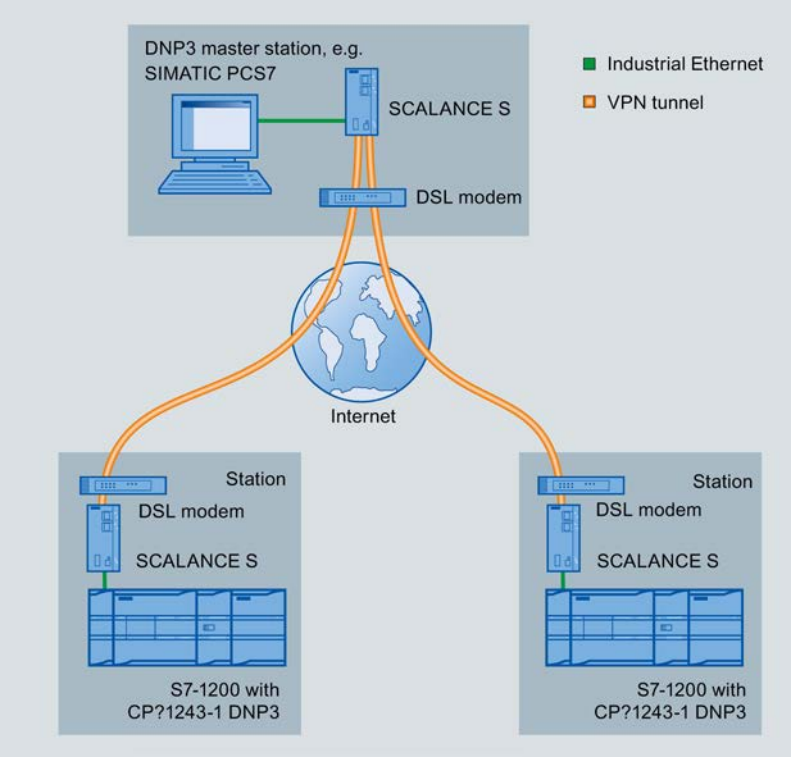


Figure 1-2 Configuration example with connections over the Internet

Options of the Internet connection

There are various ways of configuring the Internet connection:

- DSL modem + SCALANCE S

  This is the configuration of the example shown in the figure.

  In this case, use a standard DSL modem. With the security module SCALANCE S, you establish the VPN connection.

- DSL router with VPN capability

  In such a configuration, use a DSL router with VPN capability.

- Mobile wireless router

  If the station needs to be connected to the Internet using mobile wireless (GSM network / GPRS), the SIMATIC NET router SCALANCE M87x is used.

Addressing

Refer to the information in the section Addressing and network configuration (Page 31).

1.5.3 Configuration with a redundant control center

Configuration example with a redundant control center

The following example contains a configuration with a redundant control center and connections via the Internet.

In this example, the DNP3 protocol is used; in other words, the stations are equipped with a CP 1243-1 DNP3.

A configuration in which the IEC protocol is used would have the same setup apart from the CP type (here CP 1243-1 IEC).

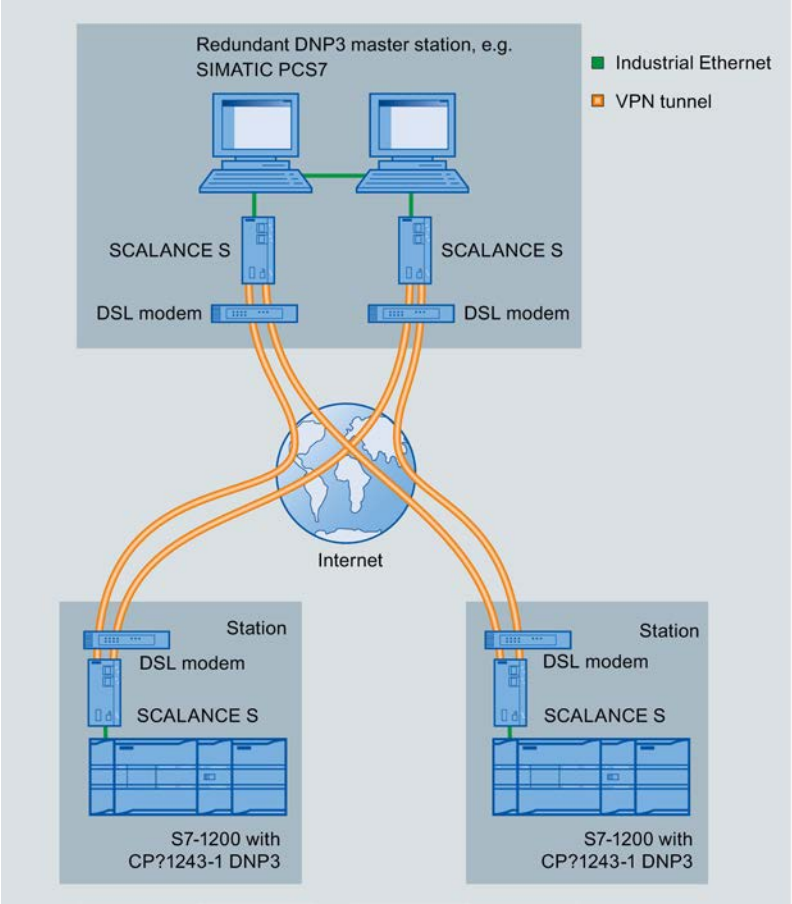


Figure 1-3 Configuration example with a redundant DNP3 master station

Addressing of the redundant DNP3 master

The two devices of the redundant DNP3 master in the control center are addressed by the DNP3 CP using one DNP3 address but two different IP addresses.

Requirements for use 2

2.1 Hardware requirements

The following setups do not take into account rails, housing, cabling and other accessories.

Depending on the configuration of your plant, you require the following devices and firmware versions.

Application example: Project with 1 subnet

The following setup assumes that the master and stations are located in 1 IP subnet, see also the section Configuration with 1 subnet (Page 14).

In the S7-1200 station:

- **DNP3**
  - When using a DNP3 CP with firmware version V1.0: A CPU with firmware version V3.0.
  - When using a DNP3 CP with firmware version V1.1: A CPU with firmware version V3.0 or V4.0.
- **IEC**
  - IEC CP
  - CPU with firmware version V3.0 or V4.0

In the master station:

- PC for compatible DNP3 or IEC master

  With redundantly designed master stations, the hardware needs to be doubled.
- When using online functions: Engineering station with STEP 7 (see following section)

Application example: Distributed project connections over the Internet

In the remote S7-1200 station:

The following set up assumes that the master and stations communicate via the Internet, see also the section Configuration with connections over the Internet (Page 14).

- **DNP3**
  - When using a DNP3 CP with firmware version V1.0: A CPU with firmware version V3.0.
  - When using a DNP3 CP with firmware version V1.1: A CPU with firmware version V3.0 or V4.0.
  - DSL router + SCALANCE S

    See also the reference in the section "Notes on the DSL router" below.

- **IEC**
  - IEC CP
  - CPU with firmware version V3.0 or V4.0
  - DSL router + SCALANCE S

    See also the reference in the section "Notes on the DSL router" below.

In the master station:

- Compatible DNP3 or IEC master
- DSL router + SCALANCE S

  See also the reference in the section "Notes on the DSL router" below.
- When using online functions: Engineering station with STEP 7 (see following section)

Notes on the DSL router

You will find the requirements for communication and the configuration options in the section Configuration with connections over the Internet (Page 14).

2.2 Software requirements

Configuration software

To configure the modules, the following configuration tool is required:

- DNP3 CP with firmware version V1.0:

  STEP 7 Basic ab V12.0 SP1
- DNP3 CP with firmware version V1.1:

  STEP 7 Basic V13.0
- IEC CP with firmware version V1.1:

  STEP 7 Basic V13.0

Software for online functions

STEP 7 in the version specified above

LEDs and connectors

3

3.1 Opening the covers of the housing

Location of the display elements and the electrical connectors

The LEDs for the detailed display of the module statuses are located behind the upper cover of the module housing.

The Ethernet connector is located behind the lower hinged cover of the module.

Opening the covers of the housing

Open the upper or lower cover of the housing by pulling it down or up as shown by the arrows in the illustration. The covers extend beyond the housing to give you a grip.

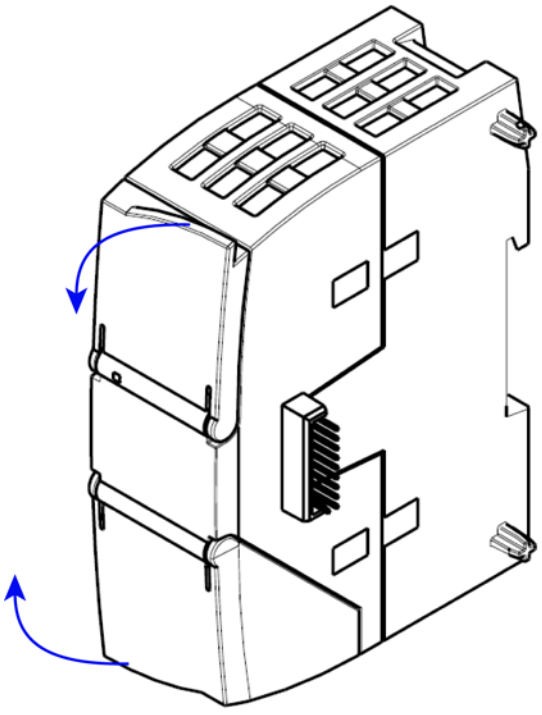


Figure 3-1 Opening the covers of the housing

3.2 LEDs

LEDs of the module

The module has various LEDs for displaying the status:

- **LED on the front panel**

  The "DIAG" LED that is always visible shows the basic statuses of the module.

- **LEDs below the upper cover of the housing**

  The LEDs below the upper cover provide more detailed information on the module status.

Table 3- 1 **LED on the front panel**

LED / colors	Name	Meaning
(red / green)	**DIAG**	Basic status of the module

Table 3- 2 **LEDs below the upper cover of the housing**

LED (color)	Name	Meaning
(green)	**LINK**	Status of the connection to Industrial Ethernet
(green)	**CONNECT**	Status of the connections to masters
(green)	**VPN**	*- inactive -*
(green)	**SERVICE**	Status of a connection for online functions

LED colors and illustration of the LED statuses

The LED symbols in the following tables have the following significance:

Table 3- 3 **Meaning of the LED symbols**

Symbol	○	● ●	☼ ☼ ●	-
LED status	OFF	ON (steady light)	Flashing	Not relevant

Note

LED colors when the module starts up

When the module starts up, all its LEDs are lit for a short time. Multicolored LEDs display a color mixture. At this point in time, the color of the LEDs is not clear.

Display of the basic statuses of the CP ("DIAG" LED)

Table 3- 4 Display of the basic statuses of the CP

DIAG (red / green)	**Meaning** **(if more than one point listed: alternative meaning)**
Basic statuses of the CP	
○	• Power OFF • Incorrect startup
● green	Running (RUN) without serious error
☼ flashing green	• Partner not connected • Firmware loaded successfully
☼ flashing red	• Starting up • Module fault • Invalid STEP 7 project data
◉ flashing red-green	Error loading firmware

Display of the operating and communications statuses

The LEDs indicate the operating and communications status of the module according to the following scheme:

Table 3- 5 Display of the operating and communications statuses

DIAG (red / green)	-	**LINK** (green)	**CONNECT** (green)	**VPN** (green)	**SERVICE** (green)	**Meaning** **(if more than one point listed: alternative meaning)**
• **Module startup (STOP → RUN)** • **Error/fault states**						
○		○	○	○	○	Power OFF
● red		●	●	●	●	Startup - phase 1
☼ flashing red		-	○	○	○	Startup - phase 2
● green		-	-	-	-	Running (RUN) without serious error
○			●	●	●	Incorrect startup
● red		-	☼	-	-	Invalid STEP 7 project data

DIAG (red / green)	-	LINK (green)	CONNECT (green)	VPN (green)	SERVICE (green)	Meaning (if more than one point listed: alternative meaning)
flashing red		-	○	-	-	Missing STEP 7 project data
flashing red		●	☼	-	-	Backplane bus error
Connection to Industrial Ethernet						
-		●	-	-	-	Connection to Industrial Ethernet exists
● green		☼	-	-	-	• Connection to Industrial Ethernet being established. • IP address being obtained.
-		○	-	-	-	No connection to Industrial Ethernet
Connection to communications partners						
● green		●	●	-	-	Connection established to at least one partner
● green		●	☼	-	-	Partner reachable, CPU in STOP mode
☼ flashing green		●	●	-	-	Partner not reachable, CPU in RUN mode
☼ flashing green		●	☼	-	-	Partner not reachable, CPU in STOP mode
Connection for online functions						
● green		●	-	-	●	Connection for online functions established
● green		●	-	-	☼	Attempt to establish connection for online functions
● green		-	-	-	○	No connection to engineering station
Loading firmware						
●		☼	☼	☼	☼	Loading firmware. The DIAG LED flashes alternating red and green.
☼ flashing green		☼	☼	☼	☼	Firmware was successfully loaded.
☼ flashing red		☼	☼	☼	☼	Error loading firmware

3.3 Electrical connections

3.3.1 Power supply

Power supply

The CM is supplied with power from the backplane bus. It does not require a separate power supply.

3.3.2 Ethernet interface X1P1

Ethernet interface

The Ethernet connector is located behind the lower hinged cover of the module. The interface is an RJ-45 jack according to IEEE 802.3.

The pin assignment and other data relating to the Ethernet interface can be found in the section Technical specifications (Page 63).

Installation, connecting up, commissioning 4

4.1 Important notes on using the device

Safety notices on the use of the device

Note the following safety notices when setting up and operating the device and during all associated work such as installation, connecting up or replacing the device.

Overvoltage protection

NOTICE
Protection of the external power supply If power is supplied to the module or station over longer power cables or networks, the coupling in of strong electromagnetic pulses onto the power supply cables is possible. This can be caused, for example by lightning strikes or switching of higher loads. The connector of the external power supply is not protected from strong electromagnetic pulses. To protect it, an external overvoltage protection module is necessary. The manufacturers of industrial overvoltage protection devices produce suitable modules.

4.1.1 Notices on use in hazardous areas

⚠ WARNING
EXPLOSION HAZARD DO NOT OPEN WHEN ENERGIZED.

⚠ WARNING
The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS). This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70). If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

WARNING

EXPLOSION HAZARD

DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

WARNING

EXPLOSION HAZARD

SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.

WARNING

When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

4.1.2 Notices regarding use in hazardous areas according to ATEX

WARNING

Requirements for the cabinet/enclosure

To comply with EU Directive 94/9 (ATEX95), this enclosure must meet the requirements of at least IP54 in compliance with EN 60529.

WARNING

If the cable or conduit entry point exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 50 °C, only use cables with admitted maximum operating temperature of at least 80 °C.

WARNING

Take measures to prevent transient voltage surges of more than 40% of the rated voltage. This is the case if you only operate devices with SELV (safety extra-low voltage).

4.1.3 Notices regarding use in hazardous areas according to UL HazLoc

⚠ WARNING
EXPLOSION HAZARD DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.

This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

This equipment is suitable for use in Class I, Zone 2, Group IIC or non-hazardous locations only.

4.2 Installation

Prior to installation and commissioning

⚠ CAUTION
Read the system manual "S7-1200 Programmable Controller" Prior to installation, connecting up and commissioning, read the relevant sections in the system manual "S7-1200 Programmable Controller", refer to the documentation in the Appendix. When installing and connecting up, keep to the procedures described in the system manual "S7-1200 Programmable Controller".

Pulling/plugging the module

NOTICE
Turning off the station when plugging/pulling the module Before pulling or plugging the module, always turn off the power supply to the station.

Dimensions for installation

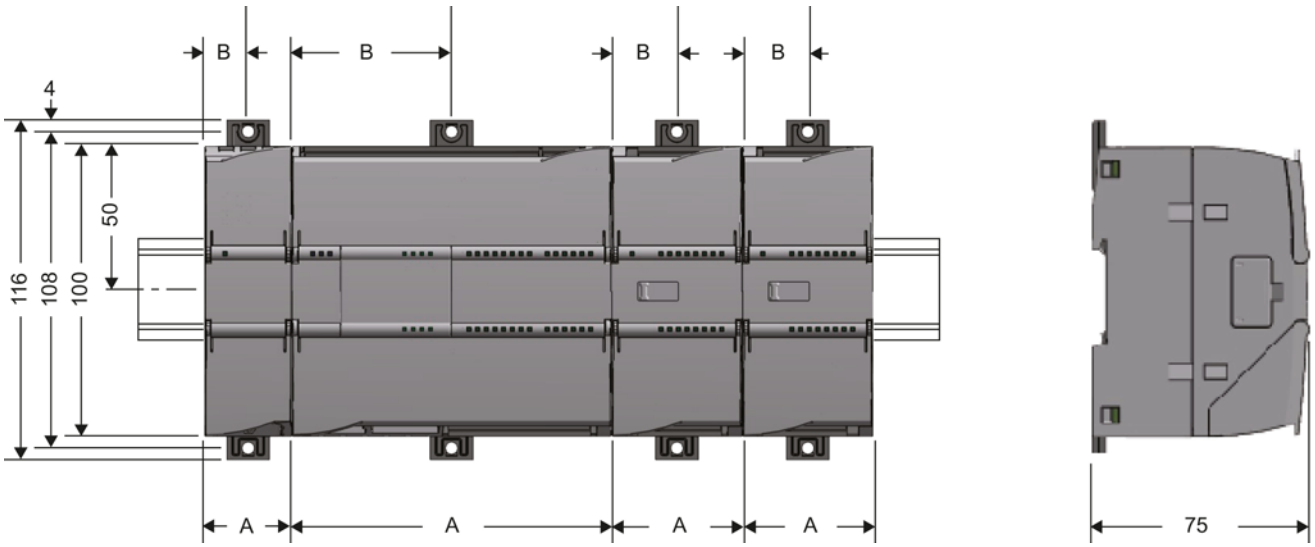


Figure 4-1 Dimensions for installation of the S7-1200

Table 4- 1 Dimensions for installation (mm)

S7-1200 devices		Width A	Width B *
CPU (examples)	CPU 1211C, CPU 1212C	90 mm	45 mm
	CPU 1214C	110 mm	55 mm
Communications interfaces (examples)	CM 1241 RS-232 and CM 1241 RS-485	30 mm	15 mm
	CM 1243-5, CM 1242-5 (PROFIBUS master / slave)	30 mm	15 mm
	CP 1242-7	30 mm	15 mm
	CP 1243-1 xxx	30 mm	15 mm

* Width B: The distance between the edge of the housing and the center of the hole in the DIN rail mounting clip

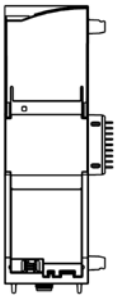
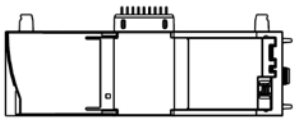
You will find detailed dimensions of the module in the section Dimension drawings (Page 69).

DIN rail clamps, control panel installation

All CPUs, SMs, CMs and CPs can be installed on the 35 mm DIN rail in the cabinet. Use the pull-out DIN rail mounting clips to secure the device to the rail. These mounting clips also lock into place when they are extended to allow the device to be installed in a switching panel. The inner dimension of the hole for the DIN rail mounting clips is 4.3 mm.

Installation location

NOTICE
Installation location The module must be installed so that its upper and lower ventilation slits are not covered, allowing adequate ventilation. Above and below the device, there must be a clearance of 25 mm to allow air to circulate and prevent overheating. Remember that the permitted temperature ranges depend on the position of the installed device.

Device position / permitted temperature range	Installation location
Horizontal installation of the rack: -20 °C to +70 °C	
Vertical installation of the rack: -20 °C to +60 °C	

4.3 Installing, connecting up and commissioning

Requirement: Configuration prior to commissioning

One requirement for the commissioning of the module is the completeness of the STEP 7 project data (see below, step 5). You should also read the section "Ethernet interface (X1) > Advanced options (Page 43)".

Installing, connecting up and commissioning the module

Note

Connection with power off

Only wire up the S7-1200 with the power turned off.

Table 4- 2 Procedure for installation and connecting up

Step	What to do	Notes and explanations
1	Mount the CP on the DIN rail and connect it to the module to its right.	Use a 35 mm DIN rail. The slots to the left of the CPU are permitted.
2	Secure the DIN rail.	
3	Connect the Ethernet cable to the CP.	You will find the pinout of the interface in the section Technical specifications (Page 63).
4	Turn on the power supply.	
5	The remaining steps in commissioning involve downloading the STEP 7 project data.	The STEP 7 project data of the CP is transferred when you load to the station. To load the station, connect the engineering station on which the project data is located to the Ethernet interface of the CPU. You will find more detailed information on loading in the following sections of the STEP 7 information system: • "Loading project data" • "Using online and diagnostics functions"
6	Close the front covers of the module and keep them closed during operation.	

Configuration and operation 5

5.1 Note on operation

NOTICE
Closing the front panels To ensure interference-free operation, keep the front panels of the module closed during operation.

5.2 Addressing and network configuration

To configure and commission the CP, the following information is required:

Address information of the master

The following information is required for the STEP 7 configuration of the CP:

- Address of the master
  - IP address

    or
  - Name that can be resolved with DNS

    If you use DNS, there must be a DNS server (see below) and this must be reachable for the CP.
- Port number of the listener port of the master
- DNS server address(es)

  You require the DNS server address if you address the master using a name that can be resolved by DNS.

Configurations with connections over the Internet: VPN connections

For connections running via the Internet, dynamic IP addresses can be used.

To allow communication in both directions and to ensure that the data is protected during transfer, a connection with a VPN tunnel is necessary. The security module SCALANCE S is ideal for this purpose.

Remember the following points when configuring:

- You configure the master IP address as normal.
- When configuring the CP interface, configure the IP address of the SCALANCE S as a router address.
- You create the VPN configurations with SCALANCE S both for the station end and for the control center end in STEP 7.

5.3 Configuration in STEP 7

Configuration in STEP 7

You configure the modules and networks in SIMATIC STEP 7. You will find the required version in the section Hardware requirements (Page 17).

You can configure a maximum of three CMs/CPs per station.

Communication via redundant transmission paths

If you insert several CPs in an S7-1200, you can establish redundant communications paths. This is only possible if the control system supports redundant transmission paths to the same station.

Communication with a redundant control system

Even with a single DNP3 CP or IEC CP, an S7-1200 can communicate with a redundant master.

The two devices of the redundant master are addressed by the CP using one DNP3 address or one IEC address but two different IP addresses.

How to configure in STEP 7

Follow the steps below when configuring:

1. Create a STEP 7 project.
2. Insert the required SIMATIC stations.

   Configuration of the master stations and connections neither possible nor necessary.
3. Insert the CPs and the required input and output modules in the stations.
4. Create an Ethernet network.
5. Connect the stations to the Ethernet subnet.
6. Configure the inserted CPs.

   For details on configuring the communication, refer to the following section.
7. Save the project.

You will find more detailed information on configuring the CP in the Information system of STEP 7 and in the following sections.

Requirement for configuring the communication

One requirement for configuring communication between CP and control center is the programming of the assigned CPU and the input and output data of the station.

PLC tags must also be created to assign the user data to the data points.

For more detailed information, refer to the following sections.

Loading and storing the configuration data

When you load the station, the project data of the station including the configuration data of the CP is stored on the CPU.

You will find information on loading the station in the STEP 7 information system.

5.4 Configuring datapoints and messages (e-mails)

Data point-related communication

No program blocks need to be programmed for the CP to transfer user data between the station and communications partner. The data areas in the memory of the CPU intended for communication with the partner are configured data point-related on the CP. Each data point is linked to a PLC tag or a data block on the CPU.

Requirement: Created PLC tags and/or data blocks (DBs)

PLC tags or DBs must first be created in the CPU program to allow configuration of the data points.

The PLC tags for data point configuration can be created in the standard tag table or in a user-defined tag table. All PLC tags intended to be used for data point configuration must have the attribute "Visible in HMI".

Address areas of the PLC tags are input, output or bit memory areas on the CPU.

Note

Number of PLC tags

Remember the maximum possible number of PLC tags the can be used for data point configuration in the section Configuration limits and performance data (Page 12).

The formats and S7 data types of the PLC tags that are compatible with the protocol-specific data point types of the CP can be found in the section Datapoint types (Page 35).

Access to the memory areas of the CPU

The values of the PLC tags or DBs referenced by the data points are read and transferred to the communications partner by the CP.

Data received from the communications partner is written by the CP to the CPU via the PLC tags or DBs.

Configuring data points and messages in STEP 7

You configure the data points in STEP 7 in the Data point and alarm configuration. You can find this using the project tree:

Project > directory of the relevant station > Local modules > CP 1243-1 xxx

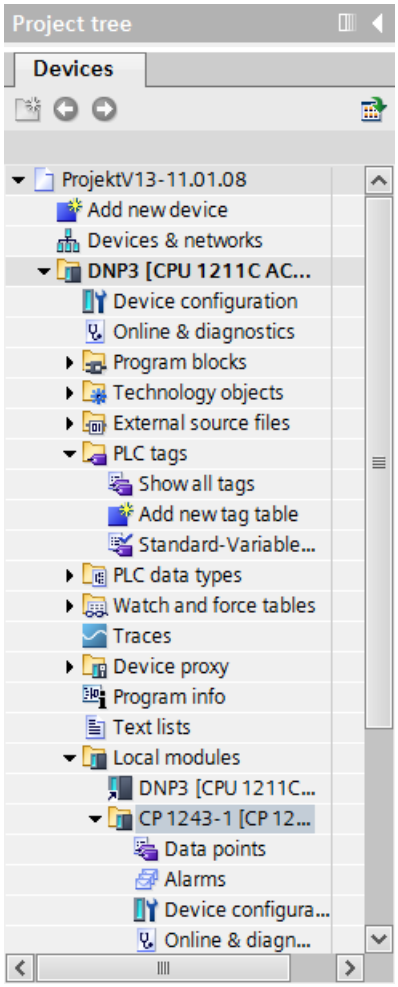


Figure 5-1 Configuring data points and messages (e-mails)

Here, you will also find the editor for configuring messages.

You will find more detailed information on configuration in the following sections and in the STEP 7 information system.

5.5 Datapoint types

During the configuration of the user data to be transferred by the CP, each data point is assigned a protocol-specific data point type. The data point types supported by the CP along with the compatible S7 data types are listed below. They are grouped according to format (memory requirements).

The direction relates to the direction of transfer (monitoring direction = "in", control direction = "out").

CP 1243-1 DNP3: Supported data point types

Table 5- 1 Supported data point types, DNP3 object groups, variants and compatible S7 data types

Format (memory requirements)	Data point type	DNP3 object group [variations]	Direction	S7 data types	Address area
Bit	Binary Input	**1** [1, 2]	in	BOOL	I, Q, M, DB
	Binary Input Event	**2** [1, 2]	in	BOOL	I, Q, M, DB
	Binary Output 1)	**10** [2]	out		
	Binary Output Event 1)	**11** [1, 2]	out		
	Binary Command	**12** [1]	out	BOOL	I, Q, M, DB
Integer (16 bits)	Counter Static	**20** [2]	in	UINT, WORD	I, Q, M, DB
	Frozen Counter 2)	**21** [2, 6]	in		
	Counter Event	**22** [2, 6]	in	UINT, WORD	I, Q, M, DB
	Frozen Counter Event 3)	**23** [2, 6]	in		
	Analog Input	**30** [2]	in	INT	I, Q, M, DB
	Analog Input Event	**32** [2]	in	INT	I, Q, M, DB
	Analog Output Status 4)	**40** [2]	out		
	Analog Output	**41** [2]	out	INT	I, Q, M, DB
	Analog Output Event 4)	**42** [2, 4]	out		
Integer (32 bits)	Counter Static	**20** [1]	in	UDINT, DWORD	I, Q, M, DB
	Frozen Counter 2)	**21** [1, 5]	in		
	Counter Event	**22** [1, 5]	in	UDINT, DWORD	I, Q, M, DB
	Frozen Counter Event 3)	**23** [1, 5]	in		
	Analog Input	**30** [1]	in	DINT	I, Q, M, DB
	Analog Input Event	**32** [1]	in	DINT	I, Q, M, DB
	Analog Output Status 4)	**40** [1, 3]	out		
	Analog Output	**41** [1]	out	DINT	I, Q, M, DB
	Analog Output Event 4)	**42** [1]	out		
Floating-point number (32 bits)	Analog Input	**30** [5]	in	REAL	Q, M, DB
	Analog Input Event	**32** [5, 7]	in	REAL	Q, M, DB
	Analog Output Status 4)	**40** [3]	out		
	Analog Output	**41** [3]	out	REAL	Q, M, DB
	Analog Output Event 4)	**42** [5, 7]	out		

Format (memory requirements)	Data point type	DNP3 object group [variations]	Direction	S7 data types	Address area
Floating-point number (64 bits)	Analog Input	**30** [6]	in	LREAL	Q, M, DB
	Analog Input Event	**32** [6, 8]	in	LREAL	Q, M, DB
	Analog Output	**41** [4]	out	LREAL	Q, M, DB
	Analog Output Event [4]	**42** [6, 8]	out		
Block of data (1...64 bytes) [5]	Octet String	**110** [-]	in, out	[5]	I, Q, M, DB
	Octet String Event [5]	**111** [-]	in, out	[5]	I, Q, M, DB

[1] This object group can be configured in the Data point editor of STEP 7 using the substitute object group 12.

[2] This object group can be configured in the Data point editor of STEP 7 using the substitute object group 20.

[3] This object group can be configured in the Data point editor of STEP 7 using the substitute object group 22.

[4] This object group can be configured in the Data point editor of STEP 7 using the substitute object group 41.

[5] With these data point types, contiguous memory areas up to a size of 64 bytes can be transferred. All S7 data types with a size between 1 and 64 bytes are compatible. If the array is modified later, the data point must be recreated.

Explanation of the footnotes [1], [2], [3], [4]: Configuring data points using substitute object groups

The initial data point types of the following object groups can be configured using the substitute object groups listed above:

- 10 [2]
- 11 [1, 2]
- 21 [1, 2, 5, 6]
- 23 [1, 2, 5, 6]
- 40 [1, 2, 3]
- 42 [1, 2, 4, 5, 6, 7, 8]

To configure the DNP3 CP, use the specified substitute object group.

Assign each data point on the master using the configurable data point index in STEP 7. The data point of the DNP3 CP is then assigned to the corresponding data point on the master.

Example of configuring the data point Binary Output (10 [2])
The data point is configured as follows:
On the DNP3 CP as Binary Command (12 [1])
On the master as Binary Output (10 [2])

With the data point types Binary Output Event (11) and Analog Output Event (42) you also need to enable mirroring back, refer to the next section.

Configuration of the mirroring back for output events (object groups 11 and 42)

You first create the data point types Binary Output Event (object group 11) and Analog Output Event (object group 42) as described above as data points of the object groups 12 or 41.

The local values of these to object groups can be monitored for change and the changes transferred to the master (reporting changes).

Changing a local value can, for example, be caused by manual operator input on site.

To allow the value resulting from local events or interventions to be transferred to the master, the data point in question requires a channel for mirroring back.

This mirroring back function is enabled using the "Value monitoring (Reporting Changes)" option in the STEP 7 configuration, refer to the section "General" parameter group (Page 50).

Remember that to use the mirror back function, you need to interconnect the local values in the controller with the relevant PLC tag of the data point.

Time stamp of the DNP3 CP in UTC format

Time stamps are transferred in UTC format (48 bits) and contain milliseconds since 01.01.1970.

CP 1243-1 IEC: Supported data point types

Table 5- 2 Supported data point types, IEC types and compatible S7 data types

Format (memory requirements)	Data point type	IEC type	Direction	S7 data types	Address area
Bit	Single point information	<1>	in	BOOL	I, Q, M, DB
	Single point information with time tag [1)]	<30>	in	BOOL	I, Q, M, DB
	Single command	<45>	out	BOOL	I, Q, M, DB
Byte	Step position information	<5>	in	BYTE	I, Q, M, DB
	Step position information with time tag [1)]	<32>	in	BYTE	I, Q, M, DB
	Regulating step command	<47>	out	BYTE	I, Q, M, DB
Integer (16 bits)	Measured value, normalized value	<9>	in	INT	I, Q, M, DB
	Measured value, normalized value with time tag [1)]	<34>	in	INT	I, Q, M, DB
	Measured value, scaled value	<11>	in	INT	I, Q, M, DB
	Measured value, scaled value with time tag [1)]	<35>	in	INT	I, Q, M, DB
	Set point command, normalised value	<48>	out	INT	I, Q, M, DB
	Set point command, scaled value	<49>	out	INT	I, Q, M, DB
Integer (32 bits)	Bitstring of 32 bits	<7>	in	DWORD, UDINT	I, Q, M, DB
	Bitstring of 32 bits with time tag [1)]	<33>	in	DWORD, UDINT	I, Q, M, DB
	Integrated totals	<15>	in	DWORD, UDINT	I, Q, M, DB
	Integrated totals with time tag [1)]	<37>	in	DWORD, UDINT	I, Q, M, DB

Format (memory requirements)	Data point type	IEC type	Direction	S7 data types	Address area
Floating-point number (32 bits)	Measured value, short floating point number	<13>	in	REAL	Q, M, DB
	Measured value, short floating point number with time tag [1]	<36>	in	REAL	Q, M, DB
	Set point command, short floating point number	<50>	out	REAL	Q, M, DB
Block of data (1...32 Bit) [1]	Bitstring of 32 bits [2]	<7>	in	[1]	I, Q, M, DB
	Bitstring of 32 bits with time tag [1] [2]	<33>	in	[1]	I, Q, M, DB
	Bitstring of 32 bits [2]	<51>	out	[1]	I, Q, M, DB

[1] For information on the format of the time stamp, refer to the next section.

[2] With these data point types, contiguous memory areas up to a size of 32 bits can be transferred. All S7 data types with a size between 1 and 32 bits are compatible. If the array is modified later, the data point must be recreated.

Time stamp with the IEC CP

IEC CP time stamps are transferred according to the IEC specification in the "CP56Time2a" format. Note that in the frames only the first 3 bytes for milliseconds and minutes are transferred.

5.6 CPU scan cycle

Structure of the CPU scan cycle

The cycle (including the pause) with which the CP scans the memory area of the CPU is made up of the following phases:

- **High-priority read jobs**

  For data points of the type "Input", which are configured with the "High priority" setting in the data point configuration in "General > Priority in the scan cycle", the PLC tags are all read in one scan cycle.

- **Write jobs**

  In every cycle, the values of a certain number of unsolicited write jobs are written to the CPU. The number of tags written per cycle is specified for the CP in the "Communication with the CPU" parameter group with the "Max. number of write jobs" parameter. The tags whose number exceeds this value are then written in the next or one of the following cycles.

- **Low-priority read jobs - proportion**

  For data points of the type "Input", which are configured with the "Low priority" setting in the data point configuration in "General > Priority in the scan cycle", the values of a part of the PLC tags are read in every scan cycle.

  The number of tags read per cycle is specified for the CP in the "Communication with the CPU" parameter group with the "Max. number of read jobs" parameter. The tags that exceed this value and can therefore not be read in one cycle are then read in the next or one of the following cycles.

- **Cycle pause time**

  This is the waiting time between two scan cycles. It is used to reserve adequate time for other processes that access the CPU via the backplane bus of the station.

Duration of the CPU scan cycle

Since no fixed time can be configured for the cycle and since the individual phases cannot be assigned a fixed number of objects, the duration of the scan cycle is variable and can change dynamically.

5.7 Types of transmission, event classes, triggers

Classification of the data points and storage of the values

The values of data points are stored in the image memory of the CP and transferred only when queried by the master. Events are also stored in the send buffer and can be transferred unsolicited. All data points are therefore classified as follows:

- **No event / static value**

  Static values are entered in the image memory (process image of the CP).

- **Event**

  The values of data points configured as an event are also entered in the image memory of the CP. The value of the event is sent unsolicited to the communications partner if this function is enabled by the master.

  The values of events are also entered in the send buffer of the CP.

The image memory

All the current values of the configured data points are stored in the image memory. New values of a data point overwrite the last stored value in the image memory.

The values are sent after being queried by the communications partner. Refer to "Transfer after call" in the section "Types of transmission".

The send buffer

The send buffer is the data buffer on the CP for storing the values of events. The send buffer has a maximum size of 64000 events. The configured number of events is divided equally among all configured and enabled communications partners. The "Data buffer size" parameter for the size of the send buffer is described in the section Communication with the CPU (Page 49).

The frame memory operates chronologically; in other words, the oldest frames are sent first (FIFO principle). When the maximum number of events is reached and the frames could not be sent, the oldest values are overwritten.

If a connection to a communications partner is interrupted, the values of the events are retained in the buffer. When the connection returns, the buffered frames are sent.

With the DNP3 CP, additional conditions for sending the events can be specified:

- A maximum number of events in the send buffer, configurable for each event class.
- A configurable maximum storage period for events in the send buffer.

This configuration of these conditions is described in the section Ethernet interface (X1) > Advanced options (Page 43).

Types of transmission

Depending on your CP type, you have the following transmission types available:

- **Transfer after call**

  The current value of the data point is entered in the image memory of the CP. New values of a data point overwrite the last stored value in the image memory.

  After being called by the communications partner, the current value at the time is transferred.

- **Event class**

  The value is entered in the send buffer triggered as an event. If unsolicited transfer is enabled by the master, the value is transferred unsolicited.

  You will find details of the event classes in the following sections.

The type of transmission is specified for each data point in the data point configuration in STEP 7 with the "Type of transmission" or "Event class" parameter.

Event classes for the DNP3 protocol

The process data of the various event classes is handled as follows:

- **Event class 1 / event class 2**

  Each value change is entered in the send buffer in chronological order.

  The evaluation of the classification (1 or 2) must be handled by the master.

- **Event class 3**

  Only the current value at the time the trigger condition was met is entered in the image memory and overwrites the last value stored there.

Event classes for the IEC protocol

The process data of the various event classes is handled as follows:

- **Every value triggered**

  Each value change is entered in the send buffer in chronological order.

- **Current value triggered**

  Only the current value at the time the trigger condition was met is entered in the image memory and overwrites the last value stored there.

Trigger

Trigger types

Various trigger types are available for event-driven transfer:

- **Threshold value trigger**

  The value of the data point is transferred when this reaches a certain threshold. The threshold is calculated as the difference compared with the last stored value, refer to the section Threshold value trigger (Page 54).

- **Time trigger**

  The value of the data point is transferred at configurable intervals or at a specific time of day.

- **Event trigger**

  The value of the data point is transferred when a configurable trigger signal is fired. For the trigger signal, the edge change (0 → 1) of a trigger bit is evaluated that is set by the user program. When necessary, a separate trigger bit can be configured for each data point.

Resetting the trigger bit

If the memory area of the trigger bit is in the bit memory or in a data block, the trigger bit is reset to zero when the data point is transferred.

Generation of events if a data point status changes

The status IDs of the data points described in the section Communications services (Page 9) also cause event-driven transfer.

With data points that were configured as an event, a change in a status bit causes an event to be generated and therefore results in unsolicited transfer.

Example: If the status "RESTART" or "NT" of a data point configured as an event changes to "Value updated" when the station starts up, this causes the transfer of the value.

5.8 Notes on configuring individual functions

Below, you will find information on the configuration of individual functions grouped according to parameter groups in STEP 7.

Note

Information in STEP 7 and in the manual

If there are discrepancies between the following descriptions and the information in STEP 7 / Professional V13, the information in this document is valid.

5.8.1 Communication types and SNMP

In the two following parameter groups, you enable the types of communication of the CP.

To minimize the risk of unauthorized access to the station via Ethernet, you need to enable the communications services that the CP will execute individually. You can enable all options but at least one option should be enabled.

"Communication types" parameter group

- **Enable DNP3 protocol / Activate telecontrol communication (IEC)**

  Enables communication using the DNP3 protocol or the IEC protocol on the CP.

- **Activate online functions**

  Enables access to the CPU for the online functions via the CP (diagnostics, loading project data etc.). If the function is enabled, the engineering station can access the CPU via the CP.

  If the option is disabled, you have no access to the CPU via the CP with the online functions. Online diagnostics of the CPU with a direct connection to the interface of the CPU however remains possible.

- **Enabling S7 communication**

  Enables S7 communication on the CP.

  If you configure S7 connections to the relevant station, and these run via the CP, you will need to enable this option.

Parameter group "SNMP"

- **Enable SNMP**

  Enables communication using SNMP on the CP.

SNMP (Simple Network Management Protocol)

SNMP is a protocol for managing networks. To transmit data, SNMP uses the connectionless UDP protocol.

The information on the properties of SNMPcompliant devices is entered in MIB files (MIB = Management Information Base).

Range of performance of the CP as an SNMP agent

The CP supports data queries using SNMP in version V1.

For the CP to support the object groups of the standard MIB-II:

- Supported object groups:

  System, Interfaces, Address Translation (AT), IP, ICMP, TCP, UDP, SNMP

- Object groups not supported:

  EGP, Transmission

Write access is permitted only for the following MIB objects of the "System" group:

- sysContact, sysLocation, sysName

  A set sysName is sent as the host name using DHCP option 12 to the DHCP server to register with a DNS server.

For all other MIB objects and MIB object groups, only read access is possible for security reasons.

The CP does not support traps.

Access permissions using community name

The CP uses the following community names to control the access rights in the SNMP agent:

Table 5- 3 Access rights in the SNMP agent

Type of access	Community name *)
Read access	public
Read and write access	private

*) Note the use of lowercase letters!

5.8.2 Ethernet interface (X1) > Advanced options

Ethernet interface (X1) > Advanced options > TCP connection monitoring

The setting made here applies globally to all TCP connections of the CP.

With the DNP3 CP, note the option of overwriting the value configured here for individual communications partners, refer to the section Partner stations (Page 46).

Ethernet interface (X1) > Advanced options > Transfer settings

Transmission settings – DNP3

- **Buffer for class 1 / 2 / 3 events**

  Here, for each of the three event classes you specify the number of events after which the stored events are sent to the communications partner.

  The maximum value from each event class is 64000.

  Note: 64000 is also the value of the total size of the send buffer.

- **Delay time class 1 / 2 / 3 events**

  Here, for each of the three event classes you specify the maximum time the events can be stored in the send buffer before they are sent to the communications partner.

You will find details of how the send buffer works (storing and sending events) as well as the options for transferring data in the section Types of transmission, event classes, triggers (Page 39).

Transmission settings - IEC 60870-5

Note

Settings on the master

When configuring the monitoring times t_1 and t_2 make sure that you make the corresponding settings on the master so that there are no unwanted error messages or connection aborts.

- **Frame monitoring time** (t_1)

  Monitoring time for the acknowledgement of frames sent by the IEC CP by the communications partner. The monitoring time applies to all frames sent by the IEC CP in I, S and U format.

  If the partner does not send an acknowledgment during the monitoring time, the IEC CP terminates the connection to the partner.

  Permitted range: 0 ... 65535 s.

  Default setting: 15 s

  If you enter 0 (zero), the function is deactivated.

- **Monitoring time for S and U frames** (t_2)

  Monitoring time for the acknowledgment of data frames of the master by the IEC CP.

  After receiving data from the master, the CP acknowledges the received data as follows:

  – If the CP sends data to the master itself within t_2, it acknowledges the data frames received from the master during t_2 at the same time along with the sent data frame (I format).

  – The CP sends an acknowledgment frame (S format) to the master of the latest when t_2 elapses.

  Permitted range: 0 ... 65535 s

  Default setting: 10 s

  If you enter 0 (zero), the function is deactivated.

  The value of t_2 should be less than that of t_1.

- **Idle time for test frames** (t_3)

  Monitoring time during which the IEC CP has not received any data from the master. This parameter is intended for situations in which longer idle periods occur; in other words, times when there is no data traffic.

  When t_3 elapses, the IEC CP sends a test/control frame (U format) to the master and enters a message in the diagnostics buffer of the CPU.

  Permitted range: 0 ... 65535 s

  Default setting: 30 s

  If you enter 0 (zero), the function is deactivated.

- **Difference between send and receive sequence number**

  The difference between the send sequence number and receive sequence number of a frame.

  The master returns the send sequence number of a frame from the CP that the sending CP then saves as the receive sequence number. Frames whose send sequence number is lower than the receive sequence number after the difference configured here is added are evaluated as having been successfully transferred and are deleted from the send buffer of the CP.

  Permitted range: 1 ... 64

  Default setting: 12

5.8.3 Partner stations

Partner stations > "Partner 'X'"

- **Partner number**

  The partner number is assigned by the system automatically and is used not to identify only the master address but also the communications partner. The partner number is required during configuration of the datapoints to assign the datapoints to a communications partner.

- **Master station address**

  Station address of the communications partner (master). The station address is required to identify the master in the network.

  The same station address must be assigned to the master during its own configuration.

  – DNP3:

    Note on SIMATIC PCS 7 as DNP3 master: The station address is configured there as ASDU.

Partner stations > Partner 'X' > "Connection to partner"

The TCP connection monitoring time is set for all TCP connections of the CP in the parameter group of the Ethernet interface, see also the section Ethernet interface (X1) > Advanced options (Page 43). These settings apply to all TCP connections of the CP.

With the DNP3 CP, it is also possible to set the globally set TCP connection monitoring time separately for each individual partner:

- **TCP connection monitoring time**

  The value set in the partner station of the DNP3 CP overwrites the global value for this partner that was set in the parameter group "Ethernet interface (X1) > Advanced options > TCP connection monitoring".

With the IEC CP, the monitoring time can only be set globally for the Ethernet interface and are not for each individual communications partner.

Partner stations > Partner 'X' > "Advanced settings"

- **DNP3 level**

  Indicates the DNP3 implementation level supported by the CP

  For the communication between the DNP3 CP and the master, the DNP3 level supported by the master must be known.

  For more detailed information, refer to the section Partner stations (Page 46).

- **Report partner status**

  If the "Report partner status" function is enabled, the CP signals the status of the communication to the remote partner.

  – Bit 0 of "PLC tag for partner status" (data type WORD) is set to 1 if the partner can be reached.

  – Bit 1 is set to 1 if all the paths to the remote partner are OK (useful with redundant paths).

  – Bit 2 indicates the status of the send buffer (frame memory).
  The following values are possible:

  - 0: send buffer OK

  - 1: send buffer threatening to overflow (more than 80 % full).

  - 3: send buffer has overflowed (fill level 100 % reached).

  As soon as the fill level drops below 50%, bit 3 is reset to 0.

  Bits 3 to 15 of the PLC tags are not used and do not need to be evaluated in the program.

Partner stations > Partner 'X' > "Advanced settings" > DNP3 level (DNP3 only)

Various levels of protocol conformity are defined in the DNP3 protocol and they describe the supported range of functions (subset) of a master or a station. These levels (implementation levels) are known as "DNP3 Application Layer protocol Level" and abbreviated with DNP3-L1 to DNP3-L4.

The selection of the level used by the DNP3 CP which must correspond to that of the connected master is set separately in STEP 7 for each individual communications partner (DNP3 master).

The CP supports the following implementation levels:

- DNP3-L1
- DNP3-L2
- DNP3-L3
- DNP3-L4
- DNP3-L5

  The implementation level known here as DNP3L5 that is not specified in the standard contains the range of functions of DNP3L4 and in addition support of the following DNP3 data types / variations:

  – 64-bit analog value as floating-point number without time of day

  – 64-bit analog value as floating-point number with time of day

  – Counter event with time of day in 16-bit format

  – Counter event with time of day in 32-bit format

5.8.4 Partner stations > Security options (DNP3)

Partner stations > Partner 'X' > "Security options" (DNP3 CP only)

Preliminary remarks: Authentication and key exchange

If the security function is enabled, the DNP3 master and station (DNP3 CP) authenticate themselves with a secret key, the pre-shared key.

With the help of the common pre-shared key, after the first connection establishment between master and DNP3 CP, session keys are agreed that are then renewed cyclically. Renewal of the session keys is normally initiated by the master. The criteria for renewing the key are specified in the following parameters.

- Key exchange interval
- Authentication requests before key exchange

As soon as one of these conditions is met, the session key is renewed.

These and several other parameters are explained below.

Parameters

- **Key length**

  Specifies the length of the pre-shared key in bytes.

  Permitted range: 16 ... 128. Depending on the secure hash algorithm configured in STEP 7 above, the following lengths are preset:

  – For SHA-1: 16

  – For SHA-256: 32

  The value 0 (zero) is not permitted.

- **Max. number of key exchange requests**

  Maximum number of requests of a master within the key exchange interval configured below. If the configured number of requests of the master is exceeded within the key exchange interval, the DNP3 CP enters a message in the diagnostics buffer of the CPU. Permitted range: 2 ... 255. Default setting: 5.

- **Authentication requests before key exchange**

  Maximum number of authentication requests of the DNP3 CP with the master. When this number is reached, the session key is renewed. The value 0 (zero) is not permitted.

  Recommendation: Set the number for the DNP3 CP twice as high as for the master.

- **Key exchange interval**

  Exchange interval for the session key. When time set for this interval is reached, the session key is renewed.

  If the key exchange interval is set to 0 (zero), the key is renegotiated according to the configured "Authentication requests before key exchange".

  Recommendation: Set the key exchange interval for the DNP3 CP twice as high as for the master.

- **Authentication timeout**

  Maximum waiting time for the response from the master to an authentication request of the DNP3 CP.

  Exceeding the wait time is evaluated as an error by the DNP3 CP. In this case, the DNP3 CP generates a security event and sends this to the master. The DNP3 CP does not enter a message in the diagnostics buffer of the CPU.

  Possible values: 0 ... 65535 s. For security reasons, avoid entering 0 (zero).

- **Pre-shared key**

  The pre-shared key can be configured in two ways:

  – Manual configuration

    Enter the pre-shared key in STEP 7 manually as a hexadecimal value.

  – Import as file

    Import the pre-shared key from the file system of the engineering station if the pre-shared key was generated by the master or another engineering system.

  The pre-shared key of the DNP3 CP must be identical to the pre-shared key that the master uses.

5.8.5 Communication with the CPU

Communication with the CPU > "Data buffer size"

- **Data buffer size**

  Here, you set the size of the send buffer for events.

  A maximum of 64000 events divided up equally among the communications partners can be buffered.

You will find details of how the send buffer works (storing and sending events) as well as the options for transferring data in the section Types of transmission, event classes, triggers (Page 39).

With the DNP3 CP, other conditions for the sending of events can be configured, refer to the section Ethernet interface (X1) > Advanced options (Page 43).

5.8.6 Data point configuration

5.8.6.1 "General" parameter group

"General" parameter group

- **Value monitoring (Reporting Changes) (DNP3 CP only)**

  The option is available with the following data point types. The option must be enabled if the data points are to be configured as an Output Event with mirroring back.

  – Object group in STEP 7: Binary Output Command (12)

    Object group with option enabled: **Binary Output Event (11)**

  – Object group in STEP 7: Analog Output Command (41)

    Object group with option enabled: **Analog Output Event (42)**

  If the option is enabled, the value of the PLC tag of the data point configured as an output is monitored for changes. If the value changes, for example as a result of operator input on site, an event is generated and the changed value transferred to the master; in other words mirroring back.

  Refer to the information in the section Datapoint types (Page 35).

5.8.6.2 Threshold value trigger and Analog value preprocessing

Sequence of processing Threshold value trigger and Analog value preprocessing

Note

Threshold value trigger: Calculation only after "Analog value preprocessing"

Note that the analog value preprocessing is performed before the check for a configured threshold value.

This affects the value that is configured for the threshold value trigger, refer to the section Threshold value trigger (Page 54).

Restricted preprocessing options if mean value generation is configured

If you configure mean value generation for an analog value event, the following preprocessing options are not available:

- Unipolar transfer
- Error suppression time
- Smoothing

No Threshold value trigger if Mean value generation is configured

If mean value generation is configured, no threshold value trigger can be configured for the analog value event involved.

Analog inputs that are configured as an event are processed on the CP in the following sequence:

Sequence of analog value processing

1. Reading the data from the input area of the CPU
2. Analog value preprocessing (part 1)

   Processing involves the following steps:

   – Mean value generation

   - Mean value generation configured: Calculation and then continued at point 4.

   - No mean value generation configured: Continue with "Unipolar transfer".

   – Unipolar transfer (if configured)

   – Error suppression time (if configured)

   – Smoothing (if configured)
3. Threshold value calculation (if Threshold value trigger is configured)
4. Analog value preprocessing (part 2)

   – Adjustment to the start of measuring range and end of measuring range (if configured)
5. Storage of the value in the send buffer

   Transfer of the value to the partner if trigger and threshold value conditions are met.

5.8.6.3 "Analog value preprocessing" parameter group

Data point configuration - "Analog value preprocessing"

With the following data point types, the analog input data can be preprocessed on the CP if the data point is configured as an event:

- **DNP3:**
  – Analog Input Event (32) (16 bits)
- **IEC:**
  – Measured value, scaled <11> / Measured value, scaled with time <35>
  – Measured value, floating point <13> / Measured value, floating point with time <36>

Even if you do not configure any analog value preprocessing, keep the automatic threshold value processing in mind, refer to the section Threshold value trigger (Page 54).

5.8.6.4 Analog value preprocessing

Depending on the data point type, the functions for analog value preprocessing described below are supported.

Unipolar transfer

If unipolar transfer is enabled, negative values of analog inputs are corrected to zero.

Exception: The value -32768 / 8000_h as fault ID for wire break of live zero hardware analog inputs is transferred. With a software input, on the other hand, all values lower than zero are corrected to zero.

If mean value generation is active, this parameter has no effect.

Smoothing factor

Analog values that fluctuate quickly can be smoothed with this function.

The smoothing factors are calculated according to the following formula as with S7 analog input modules.

$$y_n = \frac{x_n + (k-1)y_{n-1}}{k}$$

where
y_n = smoothed value in the current cycle
x_n = value acquired in the current cycle n
k = smoothing factor

The following values can be configured for the module as the smoothing factor.

- 1 = No smoothing
- 4 = Weak smoothing
- 32 = Medium smoothing
- 64 = Strong smoothing

If mean value generation is active, this parameter has no effect.

Error suppression time

An analog value in the overflow range (32767 / $7FFF_h$) or underflow range (-32768 / 8000_h) is not transferred for the duration of the error suppression time. This also applies to live zero inputs. The value in the overflow/underflow range is only sent after the error suppression time has elapsed, if it is still pending.

If the value returns to the measuring range before the error suppression time elapses, the current value is transferred immediately.

A typical use case for this parameter is the suppression of peak current values when starting up powerful motors that would otherwise be signaled to the control center as a disruption.

The suppression is adjusted to analog values that are acquired by the S7 analog input modules as raw values. These modules return the specified values for the overflow or underflow range for all input ranges (also for live zero inputs).

If mean value generation is active, this parameter has no effect.

Recommendation for finished values that were preprocessed by the CPU:

If the CPU makes preprocessed finished values available in bit memory or in a data block, suppression is only possible or useful if these finished values also adopt the values listed above 32767 / $7FFF_h$ or -32768 / 8000_h in the overflow or underflow range. If this is not the case, the parameter should not be enabled for preprocessed values.

Mean value generation

With this parameter, acquired analog values are transferred as mean values.

The current values of an analog data point are acquired cyclically and totaled. The number of acquired values per time unit depends on the read cycle of the CPU and the CPU scan cycle of the CP. The mean value is calculated from the accumulated values as soon as the transfer is triggered by a time trigger. Following this, the accumulation starts again so that the next mean value can be calculated.

The mean value can also be calculated if the transmission of the analog value message is triggered by a request from the communications partner. The duration of the mean value calculation period is then the time from the last transmission (for example triggered by the trigger) to the time of the request. Once again, the accumulation restarts so that the next mean value can be calculated.

If the acquired analog value is in the overflow range (32767 / $7FFF_h$) or underflow range (-32768 / 8000_h), this value can either be taken into account immediately in the calculation of the mean value or it can be suppressed for a specific period for the calculation of the mean value. The required response can be decided with the Error suppression time parameter:

- Error suppression time = 0

  Acquisition of a value in the overflow or underflow range results in the mean calculation being stopped immediately. The value 32767 / $7FFF_h$ or -32768 / 8000_h is saved as an invalid mean value for the current mean value calculation period and sent when the next analog value frame is triggered. The calculation of a new mean value is then started. If the analog value remains in the overflow or underflow range, this new value is again saved immediately as an invalid mean value and sent when the next frame is triggered.

- Error suppression time > 0

  If you have configured an error suppression time and then enable mean value generation, the value of the error suppression time is grayed out but no longer used. If mean value generation is enabled, the error suppression time is set to 0 (zero) internally.

Set start of measuring range / Set end of measuring range

In these two input boxes, you set a limit value at the start of the measuring range and at the end of the measuring range and if these limits are violated, the transfer of a frame is triggered. Configuration of a threshold value trigger is necessary for this function.

The range of the value that can be configured as a decimal number corresponds to the measuring range of the analog module (-32768 ... 32767).

By configuring these two values, you specify that the values of this analog value are transferred as a frame only in the following situations:

- When called up by the master
- When the threshold value trigger fires
- When the value of "Set start of measuring range" is exceeded
- When the value of "Set end of measuring range" is undershot

The parameters "Set start of measuring range" and Set end of measuring range" are pointless for measured values that have already been preprocessed in the CPU.

Note

Evaluation of the value even when the option is disabled

If you enable one or both options and configure a value and then disable the option later, the grayed out value is nevertheless evaluated.

To disable the two options, delete the previously configured values "Start of measuring range" or "End of measuring range" from the input boxes and then disable the relevant option.

Recommendation for quickly fluctuating analog values:

If the analog value fluctuates quickly, it may be useful to smooth the analog value first if the "Set start of measuring range" and "Set end of measuring range" parameters are enabled. This avoids a frame being sent every time a limit value is violated if the analog value fluctuates close to one of the two limit values for a longer period of time.

5.8.6.5 Threshold value trigger

The CP calculates the value for the threshold value trigger after the analog value preprocessing, refer to the section Threshold value trigger and Analog value preprocessing (Page 50).

Threshold value trigger: How the integrattion calculation works

To calculate the threshold value trigger, the integration method is used.

In the integration threshold value calculation, it is not the absolute value of the deviation of the process value from the last stored value that is evaluated but rather the integrated deviation.

The calculation cycle

The integration threshold value calculation works with a cyclic comparison of the integrated current value with the last stored value. The calculation cycle in which the two values are compared is 500 milliseconds.
(Note: The calculation cycle must not be confused with the scan cycle of the CPU memory areas).

The deviations of the current process value are totaled in each calculation cycle. The trigger is set only when the totaled value reaches the configured value of the threshold value trigger and a new process value is entered in the send buffer.

The method is explained based on the following example in which a threshold value of 2.0 is configured.

Table 5- 4 Example of the integration calculation of a threshold value configured with 2.0

Time [s] (calculation cycle)	Process value stored in the send buffer	Current process value	Absolute deviation from the stored value	Integrated deviation
0	**20.0**	**20.0**	0	0
0.5		20.3	+0.3	0.3
1.0		19.8	-0.2	0.1
1.5		20.2	+0.2	0.3
2.0		20.5	+0.5	0.8
2.5		20.3	+0.3	1.1
3.0		20.4	+0.4	1.5
3.5	**20.5**	**20.5**	+0.5	**2.0**
4.0		20.4	-0.1	-0.1
4.5		20.1	-0.4	-0.5
5.0		19.9	-0.6	-1.1
5.5		20.1	-0.4	-1.5
6.0	**19.9**	**19.9**	-0.6	**-2.1**

In this example, a value of 2.0 was configured for the threshold value trigger.

With the changes in the process value shown in the example, the threshold value trigger fires twice:

- At the time 3.5 s: The value of the integrated deviation is at 2.0. The new process value stored in the send buffer is 20.5.
- At the time 6.0 s: The value of the integrated deviation is at 2.1. The new process value stored in the send buffer is 19.9.

In this example, if a deviation of the process value of approximately 0.5 should fire the trigger, then with the behavior of the process value shown here a threshold value of approximately 1.5 ... 2.5 would need to be configured.

5.8.7 Configuring messages

Configuring e-mails

If important events occur, the CP can send e-mails to a communications partner.

You configure the e-mails in STEP 7 in the Data point and alarm configuration. You can find this using the project tree:

Project > directory of the relevant station > Local modules > CP 1243-1

For the view in STEP 7, refer to the section Configuring datapoints and messages (e-mails) (Page 33).

Requirements and necessary information

Remember the following requirements in the CP configuration for the transfer of e-mails:

- It is necessary to enable the CP-specific type of communication:
  - DNP3: "Enable DNP3 protocol"
  - IEC: "Activate telecontrol communication (IEC)"
- The parameter group "E-mail configuration" needs to be configured.

  To do this, you require the following information:
  - Access data of the SMTP server: Address, port number, user name, password
  - Email address of the recipient

Triggering e-mail transfer

One of the following events triggers sending of the e-mail:

- CPU changes to STOP.
- CPU changes to RUN.
- The connection to the partner is interrupted.
- The connection to the communications partner is re-established.
- A trigger signal is fired.

  For the trigger signal to send the e-mail, the edge change (0 → 1) of a trigger bit is evaluated that is set by the user program. When necessary, a separate trigger bit can be configured for each e-mail.

  If the memory area of the trigger bit is in the bit memory or in a data block, the trigger bit is reset to zero when the e-mail is sent.

Enable status identifier / External status

If this option is enabled in STEP 7, a status is output on the CP that provides information about the processing status of the sent e-mail. The status is written to a PLC tag of the type DWORD that is specified in the "External status" box.

The meaning of the statuses returned in hexadecimal format is as follows:

Table 5- 5 Meaning of the status ID output in hexadecimal format

Status	Meaning
0000	Transfer completed free of errors
82xx	Other error message from the e-mail server Apart from the leading "8", the message corresponds to the three-digit error number of the SMTP protocol.
8401	No channel available Possible cause: There is already an e-mail connection via the CP. A second connection cannot be set up at the same time.
8403	No TCP/IP connection could be established to the SMTP server.

Status	Meaning
8405	The SMTP server has denied the login request.
8406	An internal SSL error or a problem with the structure of the certificate was detected by the SMTP client.
8407	Request to use SSL was denied.
8408	The client could not obtain a socket for creating a TCP/IP connection to the mail server.
8409	It is not possible to write via the connection. Possible cause: The communications partner reset the connection or the connection aborted.
8410	It is not possible to read via the connection. Possible cause: The communications partner reset the connection or the connection aborted.
8411	Sending the e-mail failed. Cause: There was not enough memory space for sending.
8412	The configured DNS server could not resolve specified domain name.
8413	Due to an internal error in the DNS subsystem, the domain name could not be resolved.
8414	An empty character string was specified as the domain name.
8415	An internal error occurred in the cURL module. Execution was aborted.
8416	An internal error occurred in the SMTP module. Execution was aborted.
8417	Requests to SMTP on a channel already being used or invalid channel ID. Execution was aborted.
8418	Sending the e-mail was aborted. Possible cause: Execution time exceeded.
8419	The channel was interrupted and cannot be used before the connection is closed.
8420	Certificate chain from the server could not be verified with the root certificate of the CP.
8421	Internal error occurred. Execution was stopped.
8450	Action not executed: Mailbox not available / unreachable. Try again later.
84xx	Other error message from the e-mail server Apart from the leading "8", the message corresponds to the three-digit error number of the SMTP protocol.
8500	Syntax error: Command unknown. This also includes the error of having a command chain that is too long. The cause may be that the e-mail server does not support the LOGIN authentication method. Try sending e-mails without authentication (no user name).
8501	Syntax error. Check the following configuration data: Alarm configuration > E-mail data (Content): • Recipient address ("To" or "Cc").
8502	Syntax error. Check the following configuration data: Alarm configuration > E-mail data (Content): • Email address (sender)
8535	SMTP authentication incomplete. Check the "User name" and "Password" parameters in the CP configuration.

Status	Meaning
8550	SMTP server cannot be reached. You have no access rights. Check the following configuration data: • CP configuration > E-mail configuration: – User name – Password – Email address (sender) • Alarm configuration > E-mail data (Content): – Recipient address ("To" or "Cc").
8554	Transfer failed
85xx	Other error message from the e-mail server Apart from the leading "8", the message corresponds to the three-digit error number of the SMTP protocol.

Diagnostics and upkeep

6

6.1 Diagnostics options

The following diagnostics options are available.

LEDs of the module

For information on the LED displays, refer to the section LEDs (Page 20).

STEP 7: The "Diagnostics" tab in the Inspector window

Here, you can obtain the following information on the selected module:

- Entries in the diagnostics buffer of the CPU
- Information on the online status of the module

STEP 7: Diagnostics functions in the "Online > Online and diagnostics" menu

Using the online functions, you can read diagnostics information from the CP from an engineering station on which the project with the CP is stored. You obtain the following static information on the selected module:

- General information on the module
- Diagnostics status
- Information on the Ethernet interface:
  - Network
  - Ethernet interface
  - Statistics

If you want to operate online diagnostics with the station via the CP, you need to select Activate online functions, see section Communication types and SNMP (Page 42).

You will find further information on the diagnostics functions of STEP 7 in the STEP 7 information system.

6.2 Downloading firmware

New firmware versions of the CP

If a new firmware version is available for the module, you will find this on the Internet pages of Siemens Industry Online Support under the following ID:

68853485 (http://support.automation.siemens.com/WW/view/en/68853485)

On the Internet page, select the "Entry list" tab and the "Download" entry type. You will find the firmware file and a description of the procedure there.

Downloading the firmware via the Web server of the CPU

Follow the steps below to connect to the Web server of the CPU and to download the CP's new firmware file to the station.

Requirements in the CPU configuration

1. Open the corresponding project on the engineering station.
2. Select the CPU of the station involved in STEP 7.
3. Select the "Web server" entry.
4. In the parameter group "General", select the "Enable Web server for this interface" option.
5. With a CPU version V4.0 or higher, create a user in the user management with the name "admin".

   You need to assign the right to perform firmware updates in the access level.

The procedure for establishing a connection to the Web server depends on whether you have enabled or disabled the "Allow access only using HTTPS" option in the "General" parameter group:

- **Connection establishment with HTTP**

  Procedure if the "Allow access only using HTTPS" option is disabled

- **Connection establishment with HTTPS**

  Procedure if the "Allow access only using HTTPS" option is enabled

These two variants are described in the following sections.

You will find the requirements for access to the Web server of the CPU (permitted Web browser) and the description of the procedure in the STEP 7 information system under the keyword "Information about the Web server".

Connection establishment with HTTP

1. Connect the PC on which the new firmware file is located to the CPU via the Ethernet interface.
2. Enter the address of the CPU in the address box of your Web browser: **http**://<IP address>
3. Press the Enter key.

   The start page of the Web server opens.
4. Click on the "Download certificate" entry at the top right of the window.

   The "Certificate" dialog opens.

5. Download the certificate to your PC by clicking the "Install certificate ..." button.

   The certificate is loaded on your PC.

   You will find information on downloading a certificate in the help of your Web browser and in the STEP 7 information system under the key words "HTTPS" or "Access for HTTPS (S7-1200)".

6. When the connection has changed to the secure mode HTTPS ("**https**://<IP address>/..." in the address box of the Web server), you can continue as described in the next section "Downloading firmware".

   If you terminate the connection to the Web server, the next time you can log in with the Web server without downloading the certificate using HTTP.

Connection establishment with HTTPS

1. Connect the PC on which the new firmware file is located to the CPU via the Ethernet interface.
2. Enter the address of the CPU in the address box of your Web browser: **http**s://<IP address>
3. Press the Enter key.

   The start page of the Web server opens.

4. Continue as described in the following section "Downloading firmware".

Loading firmware

1. Log in on the start page of the Web server as an administrator.
   - User name: admin
   - Password: No password necessary
2. After logging in, select the entry "Module status" in the navigation panel of the Web server.
3. Select the CP in the module list.
4. Select the "Firmware" tab lower down in the window.
5. Browse for the firmware file on your PC using the "Browse..." button and download the file to the station using the "Run update" button.

6.3 Module replacement

Module replacement

CAUTION

Read the system manual "S7-1200 Programmable Controller"

Prior to installation, connecting up and commissioning, read the relevant sections in the system manual "S7-1200 Programmable Controller" (refer to the documentation in the Appendix).

When installing and connecting up, keep to the procedures described in the system manual "S7-1200 Programmable Controller".

Make sure that the power supply is turned off when installing/uninstalling the devices.

The STEP 7 project data of the CP is stored on the local CPU. If there is a fault on the device, this allows simple replacement of this communications module without needing to load the project data to the station again.

When the station starts up again, the new CP reads the project data from the CPU.

Technical specifications

7

Table 7- 1 Technical specifications of CP 1243-1 DNP3 and the CP 1243-1 IEC

Technical specifications		
Article numbers		
• CP 1243-1 DNP3 • CP 1243-1 IEC	• 6GK7 243-1JX30-0XE0 • 6GK7 243-1PX30-0XE0	
Attachment to Industrial Ethernet		
Quantity	1	
Design	RJ-45 jack	
Properties	100BASE-TX, IEEE 802.3-2005, half duplex/full duplex, autocrossover, autonegotiation, galvanically isolated	
Transmission speed	10/100 Mbps	
Permitted cable lengths (Ethernet)	**(Alternative combinations per length range) ***	
0 ... 55 m	• Max. 55 m IE TP Torsion Cable with IE FC RJ45 Plug 180 • Max. 45 m IE TP Torsion Cable with IE FC RJ45 + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing/Flexible/FRNC/Festoon/Food Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing/Flexible/FRNC/Festoon/Food Cable + 10 m TP Cord via IE FC RJ45 Outlet	
0 ... 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet	
Electrical data		
Power supply	From the S7-1200 backplane bus	5 VDC
Current consumption (typical)	From the S7-1200 backplane bus	250 mA
Effective power loss (typical)	From the S7-1200 backplane bus	1.25 W
Permitted ambient conditions		
Ambient temperature	During operation with the rack installed horizontally	-20 °C to +70 °C
	During operation with the rack installed vertically	-20 °C to +60 °C
	During storage	-40 °C to +70 °C
	During transportation	-40 °C to +70 °C
Relative humidity	During operation	≤ 95 % at 25 °C, no condensation

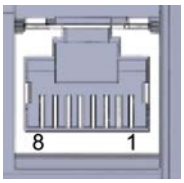
Technical specifications	
Design, dimensions and weight	
Module format	Compact module for S7-1200, single width
Degree of protection	IP20
Weight	122 g
Dimensions (W x H x D)	30 x 110 x 75 mm
Installation options	Standard DIN rail Switch panel
Product functions **	

***** For details, refer to the IK PI catalog, cabling technology
******You will find further characteristics and performance data in the section Application and properties (Page 9).

Pinout of the Ethernet interface

The table below shows the pin assignment of the Ethernet interface. The pin assignment corresponds to the Ethernet standard 802.3-2005, 100BASE-TX version.

Table 7- 2 Pin assignment of the Ethernet interface

View of the RJ-45 jack	Pin	Signal name	Assignment
	1	TD	Transmit data +
	2	TD_N	Transmit data -
	3	RD	Receive data +
	4	GND	Ground
	5	GND	Ground
	6	RD_N	Receive data -
	7	GND	Ground
	8	GND	Ground

Approvals

A

Current approvals on the Internet

SIMATIC NET products are regularly submitted to the relevant authorities and approval centers for approvals relating to specific markets and applications.

You will also find the current approvals for the product on the Internet pages of Siemens Automation Customer Support under the following entry ID:

68853485 (http://support.automation.siemens.com/WW/view/en/68853485)
→ "Entry list" tab, entry type "Certificates"

Other approvals

SIMATIC NET products are regularly submitted to the relevant authorities and approval centers for approvals relating to specific markets and applications.

If you require a list of the current approvals for individual devices, consult your Siemens contact or check the Internet pages of Siemens Automation Customer Support:

45605894 (http://support.automation.siemens.com/WW/view/en/22548697)

Under this entry, go to the relevant product and select the following settings: "Entry list" tab > entry type "Certificates".

Approvals issued

Note

Issued approvals on the type plate of the device

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

The CP has the following approvals and meets the following standards:

EC declaration of conformity

CE

The CP meets the requirements and safety objectives of the following EU directives and it complies with the harmonized European standards (EN) for programmable logic controllers which are published in the official documentation of the European Union.

- EC directive 2006/95/EEC "Electrical Equipment Designed for Use within Certain Voltage Limits" (Low Voltage Equipment Directive)
- EN 60950-1 Information Technology Equipment - Safety
- EC Directive 2004/108/EC "Electromagnetic Compatibility" (EMC Directive)
  - Emission
    EN 61000-6-4:2007: Industrial area
  - Immunity
    EN 61000-6-2:2005: Industrial area

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft
Industry Automation
Industrielle Kommunikation SIMATIC NET
Postfach 4848
D-90327 Nürnberg
Germany

You will find the EC Declaration of Conformity for this product on the Internet at the following address:

68853485 (http://support.automation.siemens.com/WW/view/en/68853485) → tab "Entry list"

Filter settings:
Entry type: "Certificates"
Certificate Type: "Declaration of Conformity"
Search items(s): <name of the module>

ATEX



ATEX approval: II 3 G Ex nA IIC T4 Gc

Relevant standards:

- EN 60079-0:2006: Potentially explosive atmosphere - general requirements
- EN 60079-15:2005: Electrical apparatus for explosive gas atmospheres; type of protection 'n'

The device is suitable for use in environments with pollution degree 2.

The device is suitable for use only in environments that meet the following conditions:

- Class I, Division 2, Group A, B, C, D and areas where there is no risk of explosion
- Class I, Zone 2, Group IIC and areas where there is no risk of explosion

WARNING

Installation guidelines

The product meets the requirements if you keep to the following during installation and operation:

- The notes in the section Important notes on using the device (Page 25)
- The installation instructions in the document /1/ (Page 71)

Over and above this, the following conditions must be met for the safe deployment of the CP:

- Install the modules in a suitable enclosure with degree of protection of at least IP54 to EN 60529 and take into account the environmental conditions for operation of the devices.
- If the rated temperatures of 70°C at the cable entry or 80°C at the branching point of the wires are exceeded, the permitted temperature range of the selected cable must be suitable for the actual measured temperatures.
- Measures must be taken to prevent the rated voltage being exceeded by more than 40% due to transient disturbances.

cULus HAZ.LOC.

Underwriters Laboratories Inc. meets

- Underwriters Laboratories, Inc.: UL 508 Listed (industrial control devices)
- UL 1604 (Hazardous Location)
- Canadian Standards Association: CSA C22.2 No 142 (process control equipment)
- CSA C22.2 No. 213 (Hazardous Location)

APPROVED for Use in:

- Cl. 1, Div. 2, GP. A, B, C, D T4A; Ta = -20 °C...60 °C
- Cl. 1, Zone 2, GP. IIC T4; Ta = -20 °C...60 °C

FM

Factory Mutual Research (FM):
Approval Standard Class Number 3600 and 3611
approved for use in:
Class I, Division 2, Group A, B, C, D, Temperature Class T4A, Ta = 60 °C
Class I, Zone 2, Group IIC, Temperature Class T4, Ta = 60 °C

C-Tick

The CP meets the requirements of the AS/NZS 2064 standards (Class A)

Dimension drawings

B

Note

All dimensions in the drawings are in millimeters.

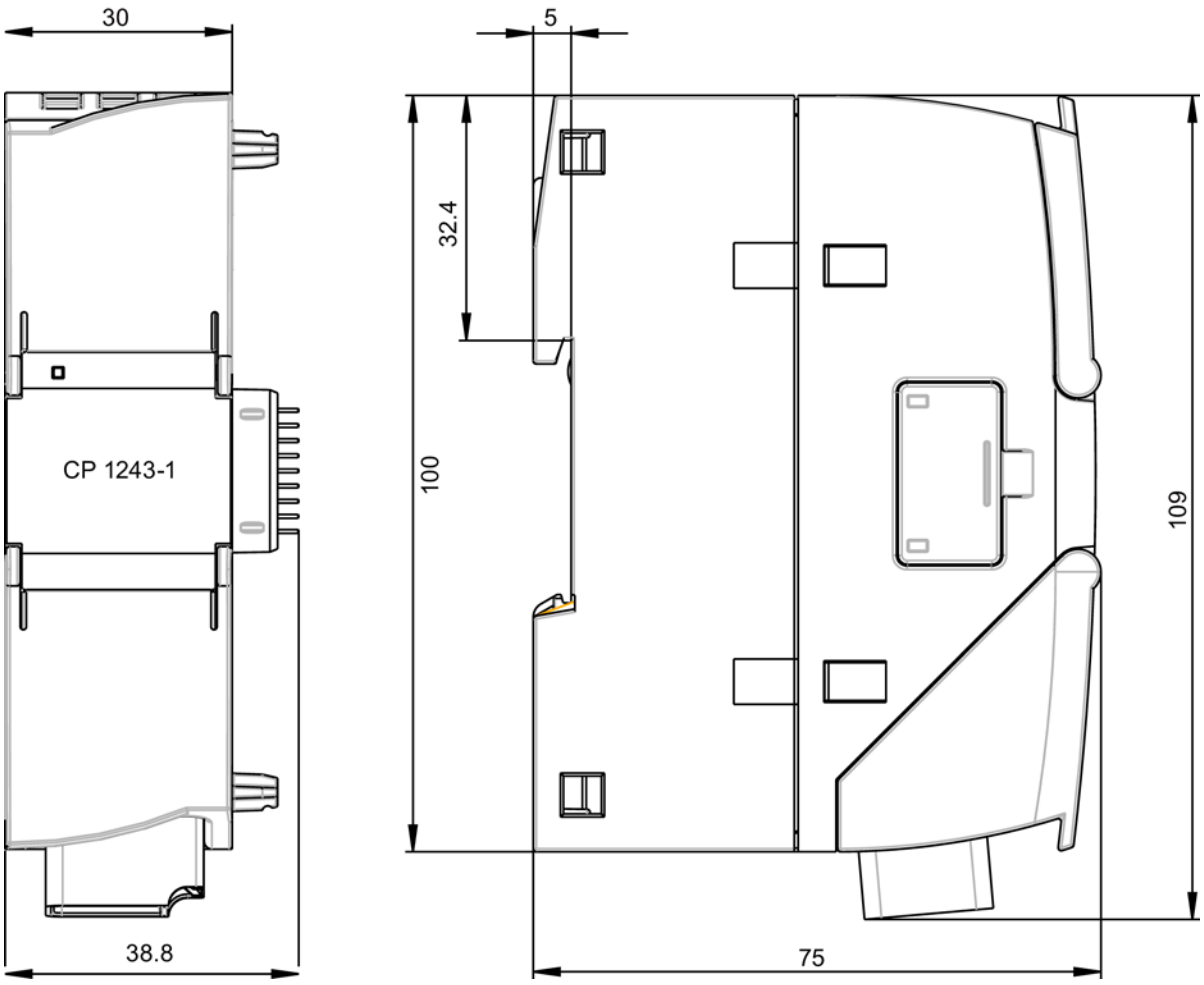


Figure B-1 CP 1243-1 DNP3 / CP 1243-1 IEC: Front view and side view left

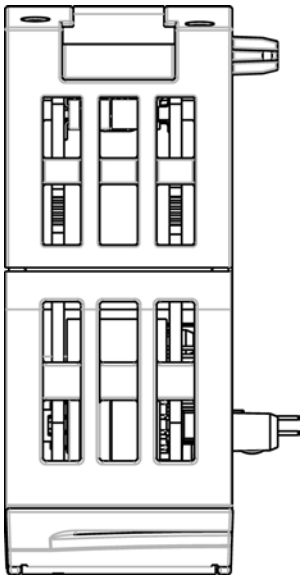


Figure B-2 CP 1243-1 DNP3 / CP 1243-1 IEC: View from above

Documentation references

C

Where to find Siemens documentation

- You will find the order numbers for the Siemens products of relevance here in the following catalogs:
  - SIMATIC NET Industrial Communication / Industrial Identification, catalog IK PI
  - SIMATIC Products for Totally Integrated Automation and Micro Automation, catalog ST 70

  You can request the catalogs and additional information from your Siemens representative.
- You will find SIMATIC NET manuals on the Internet pages of Siemens Automation Customer Support: Link to Customer Support (http://support.automation.siemens.com/WW/view/en)

  Enter the entry ID of the relevant manual as the search item. The ID is listed below some of the reference entries in brackets.

  As an alternative, you will find the SIMATIC NET documentation on the pages of Product Support:

  10805878 (http://support.automation.siemens.com/WW/view/en/10805878)

  Go to the required product group and make the following settings:

  "Entry list" tab, Entry type "Manuals / Operating Instructions"

  You will find the documentation for the SIMATIC NET products relevant here on the data medium that ships with some products:
  - Product CD / product DVD or
  - SIMATIC NET Manual Collection

/1/

SIMATIC
S7-1200 Programmable Controller
System Manual
Siemens AG
order number: 6ES7298-8FA30-8BH0
Current issue under the following entry ID:
34612486 (http://support.automation.siemens.com/WW/view/en/34612486)

/2/

SIMATIC NET
CP 1243-1 DNP3, CP 1243-1 IEC
Operating Instructions
Siemens AG
entry ID: 69270828 (http://support.automation.siemens.com/WW/view/en/69270828)

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